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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NAGPAUL, JYOTI	

ART UNIT	PAPER NUMBER
1773	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/600,391	NICKEL ET AL.	
	Examiner	Art Unit	
	JYOTI NAGPAUL	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,4-11,13-16,26 and 27* is/are rejected.

7)☒ Claim(s) *29-30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Amendment filed on November 10, 2010 has been acknowledged. Claims 2, 4-11, 13-16, 26-27 and 29-30 are pending. Claims 18-25 and 28 have been withdrawn from consideration as drawn to non-elected subject matter.

Response to Amendment

Rejection of Claims 4-5, 7-9 and 26-27 as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774) has been maintained in light of applicants' amendments.

Rejection of Claims 2, 6, 12 and 15 as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774) as applied to claim 27 above, and further in view of Taketomo has been maintained in light of applicants' amendments.

Rejection of Claims 10-11 and 16 are as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774) as applied to claim 27 above, and further in view of Hersey (US 4990412) has been maintained in light of applicant's amendments.

Rejection of Claims 13-14 as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774) as applied to claim 27 above, and further in view of Shay (US 4310607) has been maintained in light of applicant's amendments.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 4-5, 7-9 and 26-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774).

Filippi teaches a separation module comprising at least one bundle (24) comprising a plurality of porous ceramic capillaries (36) arranged in parallel. (Refer to Col. 3, Line 44 and Col. 6, Line 4) Filippi teaches each of the porous ceramic capillaries (36) in the bundle (24) being spaced apart (interstitial open areas as disclosed in Filippi) from an adjacent ceramic capillary in the bundle (24) by a defined distance. Filippi further teaches the module comprises a housing (10), which housing encloses the bundle (24), the housing having an inlet and/or outlet pipe in fluid communication with the inside of the porous ceramic capillaries for a first material flow and/or an outlet pipe in fluid communication with the (interstitial open areas) inner space between the ceramic capillaries for a second material flow. (Refer to Figure 1)

Filippi fails to teach sintered capillaries. Filippi fails to teach the capillaries are joined together by staggered ceramic film strips pressed at least partially around and connecting adjacent capillaries. The staggered ceramic film strips being wound into the at least one bundle, the staggered ceramic film strips when wound into the at least one bundle functioning as baffle plates. Filippi further fails to teach each of the sintered ceramic capillaries in the bundle having an external diameter ranging from 0.3 mm to 10 mm and an internal diameter ranging from 0.1 mm to 8 mm. Filippi fails to teach that each of the sintered ceramic capillaries in the bundle being spaced apart form an adjacent sintered ceramic capillary in the bundle by a defined distance established by the ceramic film strips. Filippi further fails to teach an end of each of the sintered ceramic capillaries passing through an end plate at a defined distance from an end of an adjacent sintered ceramic capillary also passing through the end plate.

Borrelli teaches a capillary reservoir device comprising cells of ceramic material. Borrelli teaches the formation of the cells comprises sintering to meld the ceramic material while keeping the shape of the reservoir. (Refer to Col. 4, Lines 34-67 to Col. 5, Lines 1-5)

It would have been obvious to one having ordinary skill in the art to sinter the capillaries of Filippi in order to ensure the shape of the capillary.

Filippi and Borelli fail to teach the capillaries are joined together by staggered ceramic film strips pressed at least partially around and connecting adjacent capillaries. The staggered ceramic film strips being wound into the at least one bundle, the staggered ceramic film strips when wound into the at least one bundle functioning as baffle plates. Filippi and Borelli further fail to teach that each of the sintered ceramic capillaries in the bundle having an external diameter ranging from 0.3 mm to 10 mm and an internal diameter ranges from 0.1 mm to 8 mm. Filippi and Borelli fail to teach that each of the sintered ceramic capillaries in the bundle being spaced apart form an adjacent sintered ceramic capillary in the bundle by a defined distance established by the ceramic film strips. Filippi and Borelli further fail to teach an end of each of the sintered ceramic capillaries passing through an end plate at a defined distance from an end of an adjacent sintered ceramic capillary also passing through the end plate.

Filippi teaches the ceramic capillary tubes are woven with a thread (38) with the tubes being generally parallel to each other to form a defined distance (interstitial open areas) and then rolled to form a bundle (34) and the ends are treated with a resinous material to form an end plate (common headers (26 and 28)). Fillipi further teaches that

the tube being woven is used for preventing them from moving apart. (Refer to Col. 3, Lines 43-45, Col. 4, Lines 55-57 and Col. 4, Lines 45-50)

Garcera teaches an assembly of tubular filter member inside an envelope comprising capillaries (filter members) that are sintered and then joined together by staggered ceramic film strips pressed at least partially around and connecting adjacent capillaries so that they don't move under the effect of pressure differences, pressure rises and falls, occasional hammering or shock waves and also differential thermal expansions. (Refer to Col. 6, Lines 64-66 and Col. 7, Lines 13-26) Garcera further teaches sintered ceramic capillaries having an external diameter ranging from 0.3 mm to 10 mm and an internal diameter ranges from 0.1 mm to 8 mm. (Refer to Col. 4, Lines 58-60)

It would have been obvious to one having ordinary skill in the art to substitute the thread of the modified Fillipi device with staggered ceramic film strips in order to prevent movement of the ceramic capillaries under the effect of pressure differences, pressure rises and falls, occasional hammering or shock waves and also differential thermal expansions.

It would have been obvious to one having ordinary skill in the art to provide the modified sintered ceramic capillaries of Filippi and Borelli having an external diameter ranging from 0.3 mm to 10 mm and an internal diameter ranges from 0.1 mm to 8 mm in order to obtain a compact unit and improve good fluid distribution within the device.

5. **Claims 2, 6, 12 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in

view of Garcera (US 4640774) as applied to claim 27 above, and further in view of Taketomo.

Refer above for the teachings of Filippi, Borelli and Garcera.

As for claim 2, Filippi, Borelli and Garcera fail to teach the end plate is a perforated plate and wherein the distance between the sintered ceramic capillaries is further kept constant by spacers and fail to teach the distance is less than 3 mm.

Taketomo teaches a separation module. The module comprises sheet/spacers (26) at several points along the length of the capillaries so that the individual capillaries are spaced apart by a small distance. (See Figure 10 and Col. 1, Lines 50-55) The module further teaches the bottom of the capillaries is securely embedded in a support/end plate (29) for "close packing" in order to provide a sufficient space between each capillary and thus ensuring a gas passage from the outside to the inside of the capillary. (See Col. 2, Lines 5-20)

It would have been obvious to a person of ordinary skill in the art to provide end plates as disclosed in Taketomo to provide a sufficient space between each capillary and thus ensuring a gas passage from the outside to the inside of the capillary.

6. **Claims 10-11 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774) as applied to claim 27 above, and further in view of Hersey (US 4990412).

Refer above for the teachings of Filippi, Borelli and Garcera.

Filippi, Borelli and Garcera fail to teach wherein the sintered ceramic capillaries have, on the inside, a thin membrane having separation activity and the sintered ceramic capillaries have, on the outside, a thin membrane having separation activity.

Hersey teaches a cryogenic compressor for compressing hydrogen and oxygen comprising pourous tubes with thin catalytic membranes (124, 136 and 144). (Refer to Col. 7, Lines 57-69)

It would have been obvious to one having ordinary skill in the art to provide the modified device of Filippi with a thin membrane having catalytic activity on the inside and outside of the capillary in order to further versatile the functionality of the device.

7. **Claims 13-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Filippi (US 3536611) in view of Borrelli (US 6350618) and further in view of Garcera (US 4640774) as applied to claim 27 above, and further in view of Shay (US 4310607).

Refer above for the teachings of Fillipi, Borelli and Garcera.

Fillipi, Borelli and Garcera fail to teach the housing consists of stainless steal.

Shay teaches a separator bundle comprising a bundle of capillary fibers. Shay further teaches a stainless steel housing (34) that encloses the bundle of capillary fibers.

It would have been obvious to a person of ordinary skill in the art to modify the modified device of Fillipi to provide a stainless steel housing enclosing the bundle in order to use the separator module in a battery cell as disclosed in Shay.

Allowable Subject Matter

8. Claims 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments filed November 10, 2010 have been fully considered but they are not persuasive. Applicants argue that Filippi's capillaries are not porous but are "semi permeable" membranes and porous is not nearly as selective as membranes are. Examiner respectfully disagrees. With regards to the recitation "porous ceramic capillaries", it is the examiner's position that ceramic are inherently have a porous property and therefore meets the claim limitation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JYOTI NAGPAUL whose telephone number is (571)272-1273. The examiner can normally be reached on Monday thru Friday (10:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jyoti Nagpaul/
Primary Examiner, Art Unit 1773